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Search for Dark Matter in events with missing transverse momentum and a Higgs boson decaying into b-quarks with the ATLAS detector

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In hadron colliders, the proton constituents that participate in the hard scatter have almost no momentum in the transverse plane. Any imbalance observed in this plane for the products of the scatter can be interpreted as particles escaping detection. Such events can originate from Standard Model processes involving neutrinos, but might also have a more "exotic"origin. One possible explanation for the nature of Dark Matter is that it consists of stable, weakly interacting, neutral particles that would also escape detection. To be able to study these particles their production has to be accompanied by a visible object like a jet, a photon, a W or a Z boson or a Higgs boson. Compared to the other objects, the Higgs boson offers a significant advantage: it will not be produced from initial state radiation but serves as a direct probe of the interaction with the Dark Matter. The search presented in this contribution is looking for such events through the Higgs decay channel to b-quarks. The final state signature will thus consists of large missing transverse momentum and two b-jets. The signal region is a region of phase space defined to select events of interest while rejecting Standard model background as much as possible. To estimate the remaining background events dedicated phase space regions are defined, the control regions. The corresponding selections are applied to simulated samples to determine the contribution of signal and background events in the total event rate. The estimated yields depend on a number of factors: detector resolution, calibrations, choices made in modeling parameters. These factors contribute to the uncertainty on the estimated yields and are carefully calculated. The signal and control region definitions are applied to the collected data and a profile likelihood fit is performed simultaneously in these regions to extract a possible signal. This contribution will present the results from analyzing the full 13 TeV data set recorded with the ATLAS detector from 2015 to 2018.

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